different from that of the analytic geometry that the pupils gain at a bound a sense of the variety of mathematical treatment. After having defined a conic as the locus of a point that moves so that its distance from a fixed point bears a constant ratio to its distance from a fixed straight line, after having translated this property into algebraic language, and after having studied the properties of the conic from this equation, it is an illuminating step to find that a conic is the locus of the intersections of corresponding rays of projective flat pencils, that three sets of lines, properly related to each other, may be used to construct these curves that play so important a part in the physical world, and that these curves may be studied from this point of view.

Just one illustration will serve to show what points of contact there are with elementary geometry. In triangles in homology, when the center of homology is at an infinite distance in the direction perpendicular to the axis of homology, and again when the axis of homology is at an infinite distance, the constant in both cases being -1, the two figures are congruent, in reverse order in the first case, and in the same order in the second. These very elements at infinity are a part of the broadening influence of this subject. They may and should be introduced in the analytic geometry but they *must* be employed in the projective geometry; and thus the satisfaction comes in finding theorems that are true under all conditions.

It may be well in closing to recall the report of the Committee of Ten on secondary school studies. "A place should also be found either in the school or college course for at least the elements of the modern synthetic or projective geometry. It is astonishing that this subject should be so generally ignored, for mathematics offers nothing more attractive. It possesses the concreteness of the ancient geometry, without the tedious particularity, and the power of analytical geometry without the reckoning, and by the beauty of its ideas and methods illustrates the esthetic quality which is the charm of the higher mathematics, but which the elementary mathematics in general lacks."

NOTES AND NEWS.

UNDER THE DIRECTION OF FLORIAN CAJORI.

Mr. W. C. EELLS, head of the department of mathematics in Whitworth College, Washington, has been elected instructor in the United States Naval Academy at Annapolis.

The January number of the *Hibbert Journal* contains a short article by Professor C. W. COBB, of Amherst College, on "Certainty in Mathematics and in Theology."

Mr. HYLAND CLAIR KIRK has an article on "The fourth dimension" in the December number of the *Open Court*. It is a humorous satire.

BENJAMIN O. PEIRCE, Hollis professor of mathematics and natural philosophy in Harvard college, died at Cambridge, Mass., January 15, 1914. He was a

member of learned societies and the author of several books on mathematics and physics.

Mr. A. L. MILLER, A.B. 1911, A.M. 1913, of Harvard, for two years instructor in mathematics at Harvard, is now instructor in mathematics at the University of Michigan.

The mathematical club at the University of Minnesota is taking up the study of the fundamental existence theorems given by Professor G. A. BLISS in the Princeton Colloquium Lectures recently published by the American Mathematical Society.

The January number of *School Science and Mathematics* contains two articles that are of interest to readers of the MONTHLY. They are "Suggestions for the prospective mathematician," by G. A. MILLER, and "Needed,—a funeral of algebraic phraseology," by EFFIE GRAHAM, of the high school at Topeka, Kansas.

An answer-book to the DAVIS-BRENKE Calculus has just been issued by the Macmillan Company. As such an answer-book saves much of the instructor's time, it adds to his efficiency as a teacher.

A review of Paolo Ruffini's researches, carried on during the years 1799–1813, on the impossibility of the algebraic solution of the quintic and on groups of operations, is given by E. BORTOLOTTI in the *Memorie della R. Accad. di Scienze etc. in Modena*, S. 3, Vol. 12 (Sezione scienze). He aims to give some of the results reached by Ruffini in order to remove some misconceptions that are prevalent relating to Ruffini's work and in order to encourage students to read Ruffini's original publications.

Nature (Dec. 18, 1913) contains a review of A. N. WHITEHEAD and B. RUSSEL's *Principia Mathematica*, Vol. III, 1913. This volume treats of the theory of series and the theory of measurement. As in the preceding volumes, so here the authors use a new symbolism and deal with the logical deduction of the propositions from merely logical foundations.

The engineering departments of Harvard University and Massachusetts Institute of Technology are to be combined, according to a press dispatch, the departments to be conducted in the buildings of the Institute now being erected in Cambridge. The president of the Institute will be the executive head of the work, and the faculty will consist of the faculty of the Institute, enlarged by the addition of Harvard professors in the departments involved. The two institutions are to remain unchanged in name, organization, and title to property, the Institute of Technology to furnish the buildings, laboratories, and the two institutions to furnish jointly equipment and contributions to the necessary funds.

At the November meeting of the Association of Teachers of Mathematics in the Middle States and Maryland the following papers were read: MAURICE J. BABB and CHARLES F. WHEELOCK, "Are particular abilities necessary for the pupil to gain an understanding of the elementary and secondary mathematics as usually given at the present time"; JAMES C. BROWN, "A comparison at equal

school ages of the attainments in mathematics of the European and American schoolboy, with a consideration of causes and remedies"; ALBERT D. YOCUM, "Mathematics as a means to culture and discipline"; ROMIETT STEVENS, "The use of the question in the classroom."

During the recent meeting of the American Association for the Advancement of Science, held at Atlanta, Georgia, Professor H. S. WHITE of Vassar College was elected chairman of Section A. The retiring chairman of this Section, Professor E. B. VAN VLECK of Wisconsin University, delivered an address entitled "The influence of Fourier's series upon the development of mathematics." The next meeting of this Association will be held in Philadelphia, during the convocation week, 1914–15.

According to the *Bulletin des Sciences Mathématiques*, December, 1913, page 355, the Minister of Public Instruction of France began to study the question of requiring "candidats à l'agrégation des sciences mathématiques" to pass an examination in the elements of the theory of groups and their applications in the theory of equations.

During the public meeting of the Paris Academy of Sciences, held December 15, 1913, it was announced that the "Grand Prix" (3,000 francs) for the year 1916 would be given for a work applying the methods of POINCARÉ to the integration of some linear algebraic differential equations. The Academy reserves the right to examine published papers as well as manuscripts in connection with this prize.

At the same meeting of the Paris Academy of Sciences especial attention was called to the important work by M. SUNDMANN, a young astronomer of Finland, towards the solution of the famous problem of three bodies. The Academy awarded him the Pontécoulant prize, the amount of the award being doubled (1,400 francs). The recommendation was made by a commission of which ÉMILE PICARD was chairman. The statement of the problem of three bodies is well-known: To find the paths described, and the velocities at each point, of three bodies which attract one another according to Newton's law, it being supposed that the bodies are reduced to material points devoid of extension. Sundmann's research is along the path first blazed by Painlevé, continued by Levi-Civita and others. It is interesting to recall that in 1772 this Academy awarded a prize for an essay on the problem of three bodies to the illustrious LAGRANGE. An illuminating historical review of the problem of several bodies was given some years ago by President Edgar O. Lovett of the Rice Institute in Houston, Texas. It is published in *Science*, N. S., Vol. 29, 1909, pp. 81–91.

Copies of the January, 1913, issue of the MONTHLY are *very much needed*. Any one having an extra copy of this number will confer a great favor by sending it to the MANAGING EDITOR at once.